

# Generic revisions in the tribe Calenduleae (Compositae)

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## Abstract

The generic limits in the tribe Calenduleae are revised with special focus on the circumscription of *Osteospermum* L. Three new genera from southern Africa, viz. *Monoculus* B. NORD. (2 spp.), *Norlindhia* B. NORD. (3 spp.), and *Inuloides* B. NORD. (1 sp.) are established for elements previously included in *Osteospermum* or *Tripteris* LESS. The necessary new combinations are made, and the new species *Norlindhia aptera* B. NORD. is described from southernmost Namibia. The St. Helena endemic *Osteospermum sanctae-helenae* T. NORL. is transferred to *Oligocarpus* LESS. as *Oligocarpus burchellii* (HOOK.f.) B. NORD., comb. nov. Finally, *Osteospermum pinnatum* (THUNB.) T. NORL. is transferred back to *Dimorphotheca* VAILL. as *D. pinnata* (THUNB.) HARV.

## Introduction

Ongoing phylogenetic studies on the Calenduleae and a review of the tribe for the *Families and Genera of Vascular Plants* (NORDENSTAM, in press) have necessitated revisions of generic limits within this small but intriguing tribe. Especially the genus *Osteospermum* L. is in need of a refined circumscription, a process which was started with the transfer of sect. *Blaxium* to *Dimorphotheca* VAILL. and the resurrection of the genera *Tripteris* LESS. and *Oligocarpus* LESS. (NORDENSTAM 1994a, b, NORDENSTAM 1996). In this paper some further elements are segregated from *Osteospermum* and described as three new genera. A fourth new genus, *Nephrotheca* B. NORD. & KÄLLERSJÖ, is separated from *Gibbaria* CASS. and described in a separate paper (NORDENSTAM et al. 2006). A molecular study (KÄLLERSJÖ et al., in prep.) is underway to elucidate the phylogeny of the tribe. Especially the affinities and limits between *Chrysanthemoides* FABR. and *Osteospermum* are still unresolved and will be discussed in forthcoming papers (cf. also WOOD & NORDENSTAM 2004).

## Taxonomy and discussion

### *Monoculus* B. NORD., gen. nov.

*Osteospermum* sect. *Unifenestrata* T. NORL.: NORLINDH, Studies in the Calenduleae I: 321 (1943).

Type: *Monoculus monstrosus* (BURM. f.) B. NORD.

Herbae annuae glanduloso-pubescentes vel glabratae. Folia alterna caulina petiolata vel sessilia herbacea sinuato-dentata vel repanda. Capitula laxe corymbosa radiata. Involucri bractee c. biseriatae margine late albido-scariosae. Flosculi radii feminei flavi vel aurantiaci tubo villosa. Cypselae triquetrae tripartitae apice cavemulam includentes unifenestratae. Flosculi disci ♀-steriles, corolla flava lobis atropurpureis nerviis sclerenchymatibus; antherae atratae; stylus apice bifidus.

Annual herbs, glandular-pubescent or glabrescent. *Leaves* alternate, petiolate or sessile, herbaceous, sinuately dentate or lobate. *Capitula* corymbose, radiate. *Involucral bracts* ca. biseriate, with broad scarious margins. *Ray-florets* female, fertile, yellow or orange-coloured; tube hairy. *Cypselas* homomorphic, triquetrous, 3-winged, with apical cavity provided with a single window (fenestra) on the tangential face. Pappus absent. *Disc-florets* hermaphrodite, functionally male; corolla yellow, apically blackish-purple; corolla lobes with lateral sclerenchymatic strands, joining at base of lobes and continuing halfway down the tube. Anther appendage triangular, acute, blackish; filament inserted at junction of corolla tube and lobes, filament collar short, straight, with involute margins, cells with distinct nodular thickenings; endothelial tissue polarized with few indistinct thickenings. Style apically minutely bifid, sterile.

Basic chromosome number:  $x = 8$ .

Two species with a partly sympatric distribution in the western Cape and one extending into southernmost Namibia.

This new genus is related to *Tripteris*, with which it shares the three-winged cypselas and the sclerenchymatic strands in the disc-floret corolla. In *Monoculus* there is only one cypselar window (fenestra), and the generic name alludes to this feature. In *Tripteris* the cypselas are trifenestrate. Further characteristics of *Monoculus* are the annual habit, glandular pubescence, biseriate involucral bracts with broad scarious margins, and the blackish tips of the disc-floret corollas.

#### 1. *Monoculus monstrosus* (BURM. f.) B. NORD., comb. nov.

Basionym: *Calendula monstrosa* BURM. f., Prodr. Pl. Cap. : 28 (1768). – Lectotype (designated here): Herb. BURMAN, “*Calendula monstrosa* BURM. herb. et prod., donni par DELESSERT” (G-DC).

Syn.: *Tripteris clandestina* LESS., *Linnaea* 6: 97 (1831); *Osteospermum clandestinum* (LESS.) T. NORL.; NORLINDH, *Studies in the Calenduleae* I: 328 (1943). – Holotype: THUNBERG s. loco, Herb. THUNBERG no. 30713, “*Calendula hybrida*”, fol. 3 (UPS-THUNB). The holotype is annotated “*Tripteris clandestina*” by LESSING (cf. NORLINDH 1943:332).

Illustr.: J. M. BLACK, *Flora S. Australia* 4, 1929, Fig. 275; MARLOTH, *Flora S. Afr.* 3:2, 1932, Plate 67 Fig. A; NORLINDH 1943, Figs. 1 f, 33 a–h.

Erect annual herb 2–5 dm high; stem simple or branching. Leaves herbaceous, 3–6(–10) cm long, 1–3 cm wide, obtuse, margins sinuately dentate or repand. Capitula laxly corymbose or sometimes solitary; pedicels 2–5 cm long, sparsely bracteolate. Involucral bracts 8–10, 5–7 mm long, 2–4 mm wide. Ray-florets 8–10, short, equalling the involucral bracts in length or slightly longer, yellow, with or without a purplish-black basal spot. Cypsela 8–9 mm long.

Chromosome number:  $2n = 16$  (NORLINDH 1963, CHOUKSANOVA et al. 1968, TURNER 1970).

Distribution: Western Cape from the Cape Peninsula north to Calvinia and L. Namaqualand and extending into southernmost Namibia, eastwards to Swellendam and Oudtshoorn.

NORLINDH realized the synonymy of *Calendula monstrosa* and *Tripteris clandestina*, but nevertheless chose the latter epithet because of the better type specimen. He also disliked the epithet *monstrosa* as inappropriate. However, as remarked by NORLINDH, the type of *C. monstrosa* is unmistakably the same taxon as *T. clandestina*.

## 2. *Monoculus hyoseroides* (DC.) B. NORD., **comb. nov.**

Basionym: *Tripteris hyoseroides* DC., *Prodr.* 6: 458 (1838).

Syn.: *Osteospermum hyoseroides* (DC.) T. NORL.; NORLINDH, *Studies in the Calenduleae* I: 333 (1943). – Lectotype (designated here): DRÈGE 2737, Cape Prov., L. Namaqualand: between Kouise and Garip (G-DC). NORLINDH l.c. cited this specimen as type without further indication of its status.

Illustr.: NORLINDH 1943, Fig. 33 j–k.

Erect or ascending annual herb 2–5(–7) dm high, with aromatic odour; stem moderately to richly branching; lower branches ascending. Leaves herbaceous to subcarnose, up to 10 cm long and 2 cm wide, apically obtuse to rounded, margins sinuate-dentate or repand with callous-mucronate teeth. Capitula laxly corymbose, few to many, pedicels up to 10 cm long, bracteolate. Involucral bracts ca. 13, 7–8 mm long, 3–4 mm wide. Ray-florets ca. 13, yellow or orange-coloured, 2–3 times longer than involucral bracts. Cypselas 7–8 mm long.

Chromosome number:  $2n=16$  (NORLINDH 1963).

Distribution: Northwestern Cape Province: Van Rhynsdorp, Calvinia and L. Namaqualand districts.

This species is readily distinguished from *M. monstrosus* by the long rays, which are twice the length of the involucrel bracts or longer, and often orange-coloured.

**Norlindhia** B. NORD., **gen. nov.**

*Osteospermum* sect. *Efenestrata* T. NORL. subsect. *Confusa* T. NORL.

Type: *N. amplexens* (HARV.) B. NORD.

Herbae annuae glanduloso-pubescentes glandibus ad apicem atris. Folia alterna caulina herbacea integra vel sinuato-dentata vel repanda petiolata vel sessilia basaliter semiamplexicaulibus. Capitula corymbosa radiata. Involucri bractae subuniseriatae villosoglandulosae. Flosculi radii feminei flavi vel aurantiaci tubo villosoglanduloso. Cypselae tripartitae vel fere exalatae glabrae efenestratae interdum rostratae. Flosculi disci ♀-steriles sparse glandulosi flavi lobis atropurpureis sine venis distincte sclerenchymatibus; antherae calcaratae caudatae; stylus apice bifidus.

Annual herbs, glandular-pubescent with black-tipped glands. *Leaves* alternate, petiolate or sessile, sinuato-dentate or denticulate, base half-clasping. *Capitula* corymbose, radiate. *Involucrel bracts* subuniseriate or nearly biseriata, partly overlapping, numerous (ca. 18–21), villous-glandular. *Ray-florets* female, fertile, yellow to orange; tube glandular and villous with multicellular two-tiered (apically 1-tiered) trichomes. *Cypselas* homo- or dimorphic with apical cavity (sometimes small or absent), without fenestra, 3-winged or wingless, some often rostrate. *Disc-florets* functionally male, yellow with purplish-black tips; corolla without sclerenchymatic strands, glandular outside; corolla lobes apically glabrous, with thin margins with thin lateral veins but without sclerenchymatic strands; marginal resin canals present; tube short, glandular. Anthers calcarate-caudate with tails about equalling filament collar in length; endothecial tissue polarized with distinct thickenings; filament collar straight, cylindrical, uniform (without thickened cells); apical appendage triangular-ovate, margined with one distinct cell-row, blackish, acute, midlined with a dark resin duct. Style apex a short cone, minutely bifid or shortly bilobed, with mamilliform papillae, base of cone with a ring or collar of obtuse hairs; shaft with two vascular strands. Ovary glabrous, 2-veined.

Chromosome no. not known.

Three species, NW Cape Province, southern Namibia.

This new genus differs from *Tripteris* by the cypselas with small or even lacking apical cavity without fenestrae, and disc-floret corolla without distinct sclerenchymatic

veins. *Norlindhia* is distinct from *Inuloides* (cf. below) by the annual habit with cauline alternate leaves, corymbose synflorescence, presence of non-glandular hairs etc. Distinctions from *Monoculus* are found in the venation of the disc-floret corollas (no sclerenchymatic strands) and cypselar morphology (non-fenestrate).

Key to the species of *Norlindhia*:

1. Cypselas 3-winged ..... 2  
    Cypselas without wings (or with rudimentary incomplete wings) .....  
    ..... 3. *N. aptera* B. NORD.
2. Ray-florets 2–3 times longer than involucre bracts .....  
    ..... 1. *N. amplexens* (HARV.) B. NORD.  
    Ray-florets equalling involucre bracts in length or slightly longer .....  
    ..... 2. *N. breviradiata* (T. NORL.) B. NORD.

### 1. *Norlindhia amplexens* (HARV.) B. NORD., comb. nov.

Basionym: *Tripteris amplexens* HARV.; W. H. HARVEY in HARVEY & SONDER, Fl. Cap. 3: 427 p.p. (1865). *Osteospermum amplexens* (HARV.) T. NORLINDH, Studies in the Calenduleae I: 339 (1943). – Lectotype (designated here): DRÈGE 5861, L. Namaqualand (G-DC).

Further syn.: *Tripteris amplexicaulis* sensu DC., Prodr. 6: 457 p.p. (1838), non *T. amplexicaulis* (THUNB.) LESS.; *T. confusa* BOL.; H. BOLUS, Trans. S. Afr. Phil. Soc. 16: 394 (1906); *T. gracilis* J. HUTCH., J. HUTCHINSON, Ann. S. Afr. Mus. 9: 417 (1917).

Illustr.: NORLINDH 1943, Fig. 35 a–l.

*N. amplexens* is an annual herb to 0.7 m tall, with petiolate to sessile and half-clasping leaves and with richly branching synflorescences of radiate showy capitula. The vegetative parts are glandular-hairy with black-tipped glands. Ray-florets yellow or orange, while the disc-florets are yellow but dark-tipped. Also the anthers have dark tips, especially the apical appendage.

Distribution: Western Cape Province from Van Rhyndorp and Calvinia throughout L. Namaqualand.

### 2. *Norlindhia breviradiata* (T. NORL.) B. NORD., comb. nov.

Basionym: *Osteospermum breviradiatum* T. NORL., NORLINDH, Studies in the Calenduleae I: 345 (1943). – Type: SCHLECHTER 8415, Cape Prov., Clanwilliam, 150 m, 1896 (S holotype; isotypes fide NORLINDH 1943 in B, BOL, G, GRA, K, P, PRE, W, Z).

Illustr.: NORLINDH 1943, Fig. 35 m–o.

Annual herb to 0.5 m high, glandular-pubescent. Leaves alternate, petiolate or sessile and half-clasping, herbaceous, elliptic-oblong or oblong-lanceolate, 3–8 cm long, 1–2.5 cm wide. In comparison with the preceding species the capitula are fewer and less conspicuous, with much shorter yellow rays, hardly exceeding the phyllaries in length.

Distribution: Scattered occurrences from Clanwilliam northwards in Calvinia and L. Namaqualand to southernmost Namibia (MERXMÜLLER 1967).

### 3. *Norlindhia aptera* B. NORD., sp. nov.

Type: NORDENSTAM & LUNDGREN 123, Namibia, Warmbad Distr.: Hochstein, isolated kopje 21 km SE of Ai-Ais (= 62 km on Ai-Ais road from road junction 41 km N of Violsdrift), 25.VI.1974, NORDENSTAM & LUNDGREN 123 (S holotype, PRE isotype).

Illustr.: Fig. 1.

*N. amplexente* (HARV.) B. NORD. affinis sed indumento breviori et minus glanduloso, glandibus quoque brevioribus, et praesertim cypselis praecipue exalatis vel interdum aliis rudimentalibus apicalibus et raro simul basalibus instructis.

Coarse annual herb to 1 m high, branching, shortly hirsute and glandular-pubescent, somewhat glutinous, old stems and branches glabrescent; stem to 1 cm thick. Leaves alternate, sessile and amplexicaul or shortly petiolate, oblong-oblong-lanceolate to narrowly elliptic-oblong, 3–6 cm long, 1–2 cm wide, entire or shortly and bluntly few-lobed or -dentate, subcamose, midveined with fainter lateral veins, acute or obtuse and mucronate. Capitula numerous in terminal and axillary lax corymbs, radiate, yellow-flowered. Pedicels with narrowly linear to filiform 2–4 mm long bracts. Involucre hemispherical; involucre bracts 18–21, nearly biseriate, linear-lanceolate, 6–9 mm long, ca. 1.5 mm wide, acuminate, shortly hirsute and glandular and sparsely setose, with narrow scarious margins. Ray-florets ca. 21; tube 1–1.5 mm long, villous with 2-tiered multicellular obtuse trichomes; lamina narrowly oblong-oblong-lanceolate, 9–12 mm long, 1.5–2 mm wide, 4-veined. Style branches narrowly linear, ca. 2 mm long, obtuse. Cypselas ellipsoid-obovate, 4–4.5 mm long, 1.2–2 mm wide, terete and usually longitudinally sulcate with a few furrows, glabrous except for some setae along the furrows, later glabrescent or muricate, without wings or some with 3 reduced wings apically and sometimes also basally, with apical cavity without fenestrae (occasional cypselas with 1 or 3 small fenestrae), light greyish-brownish. Disc-florets numerous, functionally male. Corolla ca. 4 mm long; tube short, ca. 0.5 mm long, villous; limb narrowly campanulate, sparsely villous especially proximally; corolla lobes triangular-ovate, acute, glabrous (only minutely papillate outside apically), with thin lateral veins with thin sclerenchyma, anastomosing below sinuses and extending down the corolla as thin veins (no distinct sclerenchymatic strands extending down the corolla).



Anthers 2–2.5 mm long, distinctly caudate, apical appendage narrowly triangular, acute, somewhat thickened in the middle; endotheacial cells short, polarized (few thickenings on horizontal walls only); filament collar short, uniform. Style apically conical and bifid, sterile. Ovary narrowly oblong, glabrous, 2-veined.

Distribution: Only known from the type collection in southernmost Namibia, where it was found growing in schist and gravel on an isolated kopje.

*N. aptera* differs from the former two species by the wingless cypselas (rudimentary wings sometimes present), the shorter pubescence with fewer and shorter glands, the mostly entire leaves, and the narrower involucrel bracts with narrow scarious margins.

***Inuloides* B. NORD., gen. nov.**

*Osteospermum* sect. *Efenestrata* subsect. *Tomentosa* T. NORL.

Herba perennis, caudex subterraneus lignosus. Folia rosulata petiolata spathulata vel rotundata integra subcoriacea utrinque albido-tomentosa apice acuta ad rotundata interdum cuspidata. Capitula solitaria scaposa radiata. Involucri bracteae subuniseriatae ad subbiseriatae, interiores margine scarioso-fimbriatae. Flosculi radii feminei flavi vel lutei, in sicco cyanescentes. Cypselae triangulares trialatae, latera rugosa et apicem versus glandulifera; caverna apicalis magna efenestrata. Flosculi disci ♀-steriles flavi. Stylus sterilis apice minute bilobus.

Type: *Inuloides tomentosa* (L. fil.) B. NORD.

Monotypic:

***Inuloides tomentosa* (L. fil.) B. NORD., comb. nov.**

Basionym: *Calendula tomentosa* L. fil.; LINNÉ fil., Suppl. Pl.: 384 (1782).

Syn.: *Tripteris tomentosa* (L. fil.) LESS; LESSING, Synopsis gen. Comp.: 90 (1832); *Osteospermum tomentosum* (L. fil.) T. NORL., NORLINDH, Studies in the Calenduleae I: 336 (1943). – Holotype: THUNBERG s.n., e Cap. B. Spei ad Kafferkuyls rivier, Oct., herb. THUNBERG no. 20740 (UPS-THUNB); isotypes: “*Calendula tomentosa*”, THUNBERG, herb. MONTIN (S), herb. SWARTZ (S), “DAHL a Dr THUNBERG” (S).

Further syn.: *Osteospermum cuspidatum* DC. Prodr. 6: 463 (1838).

Illustr.: NORLINDH 1943, Fig. 34.

Tomentose perennial herb or small subshrub. *Leaves* mainly rosulate, petiolate, spathulate to orbiculate, flat, entire, apically mucronate or shortly cuspidate; petiole base somewhat clasping. *Capitulum* solitary, scapose, radiate. *Involucrel bracts* subuniseriate, inner ones with scarious-fimbriate margins. *Ray-florets* female-fertile; lamina yellow but turning blue upon drying, epidermis with elongate convex cells. *Cypselas* 3-winged, with large apical cavity but lacking fenestra, rugose between the

wings and apically somewhat glandular-hairy. *Disc-florets* functionally male, yellow; corolla lobes triangular-ovate, with translucent broad margins, small papillae apically, and sublateral thin veins with thickened sclerenchyma; no eglandular hairs, only multicellular glands on corolla and cypselas. Anther apical appendage ovate, blackish, subacute and concave, with distinct margins. Style with obtuse mamillate papillae, style apex bilobed down to the ring of short sweeping-hairs.

Distribution: A single species with scattered localities in the southwestern Cape Province. It is perhaps becoming rare, since there are rather few recent collections (cf. NORLINDH 1943 p. 339). The distribution ranges from Tulbagh and Paarl in the north to Cape Peninsula and Caledon in the south, and eastwards to Mossel Bay. The single record from the Cape Peninsula dates from 1892.

Selected specimens: Caledon, Klynriviersberge am Zwarteberg, August, ZEYHER 3068 (SONDER scripsit, S); Caledon Div., Fernkloof Nature Reserve, Hermanus, 150 m, 1.IV.1983, C. BURMANN 1122 (BOL); Bredasdorp Div., hard stony flats NW of The Poort along the Elim Road, 25.IX.1933, J. P. H. ACOCK 1768 (S); Bredasdorp Div., 2 miles W of Napier, sandy veld, 17.IX.1962, NORDENSTAM 1395 (M, PRE, S); (3420 BC), De Hoop, Potberg Nature Reserve, 1 km NW of Potberg houses at base of mountain, 190 m, 25.VII.1979, C. BURGERS 1996 (PRE); Stellenbosch, Jonkershoek Nature Reserve, 33°59'S, 18°57'E, 19.VIII.1999, A. R. WOOD 410 (S). (3321 DD), Swellendam distr., foothills of Leeurivierberg, 1.IX.1958, ESTERHUYSEN 27871 (BOL); N foothills of Langeberg mountains near Bonnidale, 1300 ft., 30.IX.1983, J. VLOK 720 (PRE). (3421 AB), Riversdale airfield, 215 m, 28.IX.1984, P. BOHINEN 8509 (PRE).

NORLINDH (1943) placed *O. tomentosum* in a subsection of its own within his sect. *Efenestrata*. As the name implies, the cypselas lack fenestrae, although they have an apical cavity which is very large.

The habit of *O. tomentosum* differs from all or most species of *Osteospermum* and *Tripteris*. It is a low perennial with rosulate tomentose leaves and scapose peduncles bearing a single capitulum. Some of the main differences from *Tripteris* are the absence of cypselar fenestrae, the thin non-sclerenchymatic venation of the disc-floret corolla, and the mamillate stigmatic papillae of the styles.

### Transfer of *Osteospermum sanctae-helenae* T. NORL. to *Oligocarpus*

#### *Oligocarpus burchellii* (HOOK. f.) B. NORD., comb. nov.

Basionym: *Tripteris burchellii* HOOK. f., in MELLISS, St. Helena: 290 (1875). – Holotype: MELLISS No. 6, St. Helena, 1867 (K). An isotype cited from B (NORLINDH 1939: 787, 1943: 184) may not be extant.

Syn.: *Osteospermum sanctae-helenae* T. NORL., Bot. Notiser, 1939: 787 (1939).



Type as above.

This species is endemic to St. Helena. It was recognized as a new species by HOOKER fil., who placed it in *Tripteris* because of the angular cypselas, with three almost wing-like primary angles and three less protruding secondary angles. NORLINDH sank *Tripteris* in *Osteospermum* and re-named the species because of homonymy (NORLINDH 1939, 1943). He did not place the species in subgenus *Tripteris*, however, but grouped it with *O. acanthospermum* and *muricatum* in sect. *Xenismia* of subgenus *Osteospermum* (“*Euosteospermum*”).

Although NORLINDH mentioned *O. acanthospermum* as the closest ally of *O. sanctae-helenae*, he pointed out its resemblance and affinity to *O. calendulaceum* in sect. *Oligocarpus*, unassigned as to subgenus. The latter is recognized as a separate genus by the present author, and the St. Helena taxon clearly belongs there on morphological evidence such as habit, involucre and floral characters.

Molecular evidence from ITS and chloroplast sequences also demonstrate a close relationship between *O. sanctae-helenae* and *Oligocarpus calendulaceus* (KÄLLERSJÖ et al., in prep.).

Perhaps also *O. acanthospermum* (DC.) T. NORL. has to be transferred to *Oligocarpus*, where it was placed by BOLUS (1886), and this issue will be further investigated. If this assumption proves correct, *Xenismia* DC. (1836) will become a synonym of *Oligocarpus* Less. (1832).

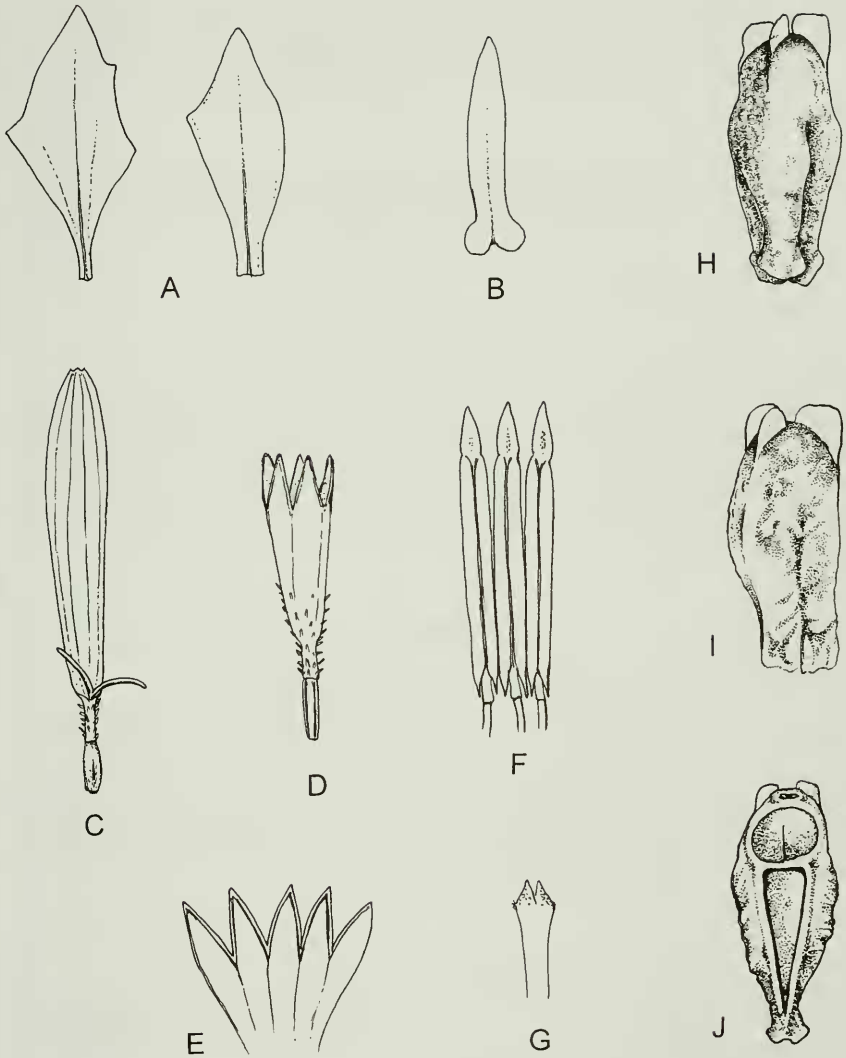
### **Transfer of *Osteospermum pinnatum* to *Dimorphotheca***

*Osteospermum pinnatum* (THUNB.) T. NORL. is anomalous in *Osteospermum* already by its annual habit and profoundly pinnatifid leaves, uniseriate involucre and especially by the white (non-yellow) rays, which are more or less purplish below. NORLINDH (1943: 191) placed it in a section of its own, *Acanthotheca* (DC.) T. NORL., based on the genus *Acanthotheca* DC. The taxon fits definitely better in *Dimorphotheca*, where it once belonged, as *D. pinnata* (THUNB.) HARV. This species will be further studied in our molecular phylogeny group. *Acanthotheca* DC. (1838) becomes a synonym of *Dimorphotheca* VAILL. (1754; cf. GREUTER et al. 2005).

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**Fig. 1.** *Norlindhia aptera* B. NORD.

A: Lower leaves,  $\times 0.7$ . B: Upper leaf,  $\times 0.7$ . C: Ray-floret,  $\times 4$ . D: Disc-floret,  $\times 8$ .  
 E: Corolla of disc-floret, laid out,  $\times 8$ . F: Anthers,  $\times 16$ . G: Tip of disc-floret style,  $\times 16$ .  
 H, I: Cypselas,  $\times 8$ . J: Cypsela, longitudinal section,  $\times 8$ . NORDENSTAM & LUNGGREN  
 123 (S). Del. B. NORDENSTAM.